REMARKS

Reconsideration of this application as amended is respectfully requested. Claims 1 through 68 are pending in this application. Claims 1, 2, 26, and 50 have been amended. New claims 69 – 73 have been added.

Claims Rejections – 35 U.S.C. §112

The Examiner has rejected claims 15, 39 and 61 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter. Specifically, the Examiner has found that limitations in these claims were inconsistent with the recitation of base claims 1, 26 and 50. Claims 1, 26 and 50 have been amended to overcome this inconsistency. As amended, these claims overcome the rejections under 35 U.S.C. §112, second paragraph.

Claims Rejection – 35 U.S.C. §103(a)

The Examiner has rejected the claims under 35 U.S.C. §103(a) as being anticipated by Palmberg, in view of Keshevan or Hedlund, Skidmore in view of Keshevan or Hedlund, and Isakov, in view of Keshevan or Hedlund. Applicants respectfully traverse these rejections.

Applicants have amended Claims 1, 26, and 50 to include the limitations with respect to the contact areas of the first and second inserts. Applicants submit that these claims as amended are not disclosed in any of the cited references, individually, or in combination with other references. The advantage of using inserts that are differently sized and shaped, and at least some of which are enhanced with a superhard material, is not obvious.

When drilling wells using percussion drill bits, the breakage of gage row inserts is a major problem. In an attempt to solve this problem, inserts enhanced with superhard materials (diamond) were used on percussion bits; however, bit failure problems continued. Applicants recognized that these superhard bit inserts continued to fail because the stress load of the

hammer exceeding the capability of the insert, and/or the insert reaching its fatigue life. Fatigue life may be increased and stress breakage reduced by running the bit with less load; however, reducing the load is not desirable because reducing the load also reduces the rate of penetration.

In addition, while the use of diamond inserts in percussion bits improved the bit cutting structure life, limitations of the bit body created additional problems. The increase in cutting structure life resulted in an increase in bit body fatigue failures. When a bit body failure occurs, the result is usually an expensive fishing operation to retrieve the broken bit from the well.

Applicants were aware of these problems and discovered a solution. Particularly, Applicants discovered that increasing the contact area of the inserts could reduce stress. The combination of elements claimed, and the specific combination of inserts, shaped and sized as claimed, resolved these problems. The drill bit described in the present invention is a stronger bit, with a superior rate of penetration and increased footage drilled. These characteristics directly result in reduced drilling costs.

The Examiner suggests that it would have been obvious to use inserts enhanced with superhard material and in dimensions within the claimed ranges; however, no reference suggests that a problem exists with the use of inserts enhanced with superhard material -- that is the continued failure of inserts and bit bodies. The question is not could a skilled artisan use superhard inserts in the size, shape and combination as claimed, but would they design such inserts to solve these problems. No reference cited by the Examiner, alone on in combination, provides motivation to uses superhard inserts, as claimed, to solve these problems.

Applicants' discovered that a combination of differently sized and shaped diamond inserts results is a superior transfer of load when using superhard inserts on percussion bits. Specifically, Applicants discovered that increasing the contact area by increasing the radius of curvature of the insert's exposed portion results in increasing the longevity of the insert by reducing contact stresses (Application page 12, lines 9-21), reducing residual stresses (Application at page 12, lines 22), resisting side impact loads (Application at page 13, line 11), and reducing torque on the bit (Application, page 14, line 11). For instance, prior art percussion

bits utilized 18mm/3/4" diamond inserts on the gage. Increasing the size of the insert to 22mm translates to a **16%** increase in contact area, but results in an impact strength improvement of **86%.**

As shown above and otherwise illustrated by technical effect, the use of a drill bit with inserts of the size, shape and configuration claimed solves previously unresolved technical problems and results in a drill bit with significantly different properties. Therefore, Applicants submit that claims 1, 26, and 50 are patentably distinguishable from the cited references. Claims 2-25, 27-49, and 51–68 are dependent on claims 1, 26, and 50. Therefor, the allowability of these claims is also asserted based on the above arguments.

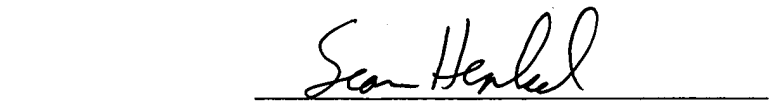
Applicants have added new claims 69-73 to further claim the present invention. Support for these claims can be found in the Application beginning at page 12, line 22; and page 16, line 21. No new matter had been added by these amendments.

Drawings

The drawing submitted on December 12, 2000 have been objected to because in Figures 4-14, parts shown in section are not properly cross-hatched. Applicants request substitution of the attached drawing sheets, which propose correction to Figures 4 – 14. This submission does not add new matter. Applicants will make formal correction of the noted defect after the application is allowed by the Examiner.

Reconsideration of the claims and the allowance thereof is respectively requested. Applicants respectfully suggest that the application has been placed in condition for allowance. Should the Examiner have any questions regarding the foregoing, please do not hesitate to contact the undersigned.

Respectfully submitted,



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Clean version of amended claims

1. A percussion drill bit for percussive drilling in a formation, comprising:
   (a) a bit head for percussive impact against the formation;
   (b) at least a first plurality of first inserts and a second plurality of second inserts extending from the bit head;
   (c) each of the first inserts having a first base portion mounted to the bit head and a first exposed portion extending from the bit head, the first exposed portion having a first profile and a first contact area;
   (d) each of the second inserts having a second base portion mounted to the bit head and a second exposed portion extending from the bit head, each of the second exposed portions having a second profile and a second contact area that is appreciable different from the first contact area of the first exposed portion, at least some of the second exposed portions enhanced with a superhard material.

2. The drill bit of Claim 1 wherein the plurality of first exposed portions and the plurality of second exposed portions are generally the same geometric shape with one of the pluralities of first and second exposed contact areas appreciably larger than the other.

26. A percussion drill bit for percussion drilling in a formation, comprising:

(a) a bit head for percussive impact against the formation;

(b) at least a first plurality of first inserts and a second plurality of second inserts extending from the bit head;

(c) each of the first inserts having a first base portion mounted to the bit head and a first exposed portion extending from the bit head, the first exposed portion having a first contact area and generally having a radius of curvature;

(d) each of the second inserts having a second base portion mounted to the bit head and a second exposed portion extending from the bit head, each of the second exposed portions generally having a radius of curvature and having a second contact area that is appreciably larger than the first contact area of the first exposed portion, at least some of the second exposed portions enhanced with a superhard material.

50. A percussion drill bit for percussive drilling in a formation, comprising:

(a) a bit head for percussive impact against the formation;

(b) at least a first plurality of first inserts and a second plurality of second inserts extending from the bit head;

(c) each of the first inserts having a first base portion mounted to the bit head and a first exposed portion extending from the bit head, each of the first exposed portions having a first contact area, and each of the first base portions being generally cylindrical with a diameter;

(d) each of the second inserts having a second base portion mounted to the bit head and a second exposed portion extending from the bit head, each of the second exposed portions having a second contact area that is appreciably larger than the first contact area, and each of the second base portions being generally being generally cylindrical with a diameter that is appreciably larger than the diameter of the first base portion, at least some of the second exposed portions enhanced with a superhard material.